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# GAS ABSTRACTS

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# 1. GAS INDUSTRY

## Carbon

Ladoo, R. B. and Stokes, C. A. INDUSTRIAL CARBON—THE PROBLEM OF SHORTAGE, AND WHAT CAN BE DONE ABOUT IT. *Chem. Ind.* **63**, 609-616 (1948) *October.*

Certain important types of industrial carbon, such as petroleum coke and wood charcoal, may be in critically short supply if trends continue. This survey is concerned primarily with the supply of carbon for non-fuel industrial uses such as electrical conductors, heat conductors, corrosion resistant linings, chemical reactants, adsorbents, lubricants, abrasives and moderators for nuclear reactions. While coal and coal coke are expected to be in adequate supply, refining trends are in the direction of reduced petroleum coke production, and less hardwood charcoal is being made. Since no process has been developed by which the various types of carbon can be economically converted one into another, shortages of certain types of carbon with desirable physical properties for particular applications are foreseen. The probable future supply of the various types of carbon is evaluated through analysis of the trends in the operations producing them, and the fields of use in which shortages may develop are indicated.

J. C. Lane

## Federal Power Commission

Dougherty, W. A. THE FEDERAL POWER COMMISSION—AND NATURAL GAS. *Public Utilities Fortnightly* **42**, 585-592 (1948) *October* 21.

The decisions in a number of cases involving Federal Power Commission regulation of natural gas transmission companies are reviewed. The provisions of the Rizley-Moore Bill which was intended to clarify and limit the regulatory powers of the FPC are discussed in considerable detail. The FPC is alleged to undertake all types of regulation not specifically forbidden to it by the somewhat broad wording of the Natural Gas Act. It is argued that the Act should be amended in clear and precise terms to delineate the FPC's powers.

J. C. Lane

## Gas Industry

Falck, E. THE FUEL OUTLOOK. *Am. Gas Assoc. Monthly* **30**, 15-18, 39 (1948) *November; Gas Age* **102**, 19-21, 58-60, 62, 64 (1948) *November; Gas* **24**, 31-34 (1948) *November.*

If natural gas prices are held down below the prices of competing fuels over a long period of time, the industry will be unable to cope with the demand and either the industry or the regulatory authorities will have to resort to a long-term program of curtailment and allocation. The natural gas industry is placed at a disadvantage in competing for capital funds because of the low rate of return allowed, and the industry has had to turn more and more to bank loans, debentures and other debt obligations to secure capital since it cannot make stock issues attractive from the interest standpoint. This condition discourages the large scale expansion of pipe lines needed both for peacetime economy and national defense. Natural gas shortages will never be overcome until natural gas prices are brought into line with the prices of competing fuels. It is recommended that gas space heating be distinguished from ordinary utility-type service and be priced on a competitive fuel basis. Deliveries of steel pipe to the natural gas industry should be accelerated in the interest of national security. Governmental regulations should be made more promotional and less restrictive. Natural gas can and should be used to release fuel oil for military and other vital uses. The natural gas industry should inform the government of these difficulties and obstacles which are delaying its progress, and the government should eliminate all such difficulties and obstacles through the formulation and execution of an effective national policy.

J. C. Lane

FPC PROPOSES RULES FOR NATURAL-GAS CARRIERS. *Oil Gas J.* **47**, 126 (1948) *November* 3.

The Federal Power Commission has proposed adoption of three general rules pertaining to applications for certificates of public convenience and necessity under the Natural Gas Act. The first proposed rule would render it unnecessary to apply for a certificate in order to add auxiliary and replacement facilities which do not increase daily delivery capacity or facilities for establishment of new delivery points required for the delivery of gas to existing customers for resale in any local community presently served from the same pipe-line system. Under the second rule, temporary certificates would be issued only where applications for permanent certificates are pending and the temporary authorization involves only minor extensions and such interconnections as required for maintenance of adequate service or to serve particular customers. Rule three would exempt temporary construction and operation for not more than 60 days from the certificate provisions of the act.

J. C. Lane

Hargrove, R. H. IMPORTANCE OF NATURAL GAS IN THE NATIONAL ECONOMY. *Oil Gas J.* **47**, 263 (1948) *November* 11.

This article consists of excerpts from a paper presented before the American Petroleum Institute. The relationship of fuel consumption to national income indicates that our whole pattern of economic life depends upon an adequate and efficient fuel supply. The fuel industries as a group should cooperate in the various phases of their operations to meet today's needs and yet maintain a position which war would not seriously disrupt. The industries may have to broaden their viewpoints to the extent of sharing markets heretofore the province of one particular industry in order that the combined facilities of the fuel industries might be available in emergencies. It may mean, today, the withdrawal from or de-emphasis of some types of markets by one industry in favor of another—or it may mean the sharing of markets in open competition. The picture of such competition, at present, shows a steady percentage increase in the consumption of oil and gas against a percentage decrease in coal consumption.

J. C. Lane

Reed, H. W. FACING FACTS IN THE GAS INDUSTRY. *Am. Gas J.* **169**, 16-19 (1948) *November.*

A straight-forward statement of the gas industry's position may do much to create better understanding and acceptance of the necessity for rate increases. Natural gas prices at the field are becoming higher as oil companies and independent operators recognize gas as a profitably saleable commodity. Compared to the prices prevailing in 1935-1939, the prices in 1947 were: for heavy oil, 179% higher; for light heating oil, 100% higher; for anthracite coal, 162% higher; for bituminous coal, 179% higher; and for coke, 172% higher. Gas was 3.7% lower in price in 1947 than in 1935-1939. The plight of manufactured gas companies, with the cost of their raw materials skyrocketing, is obvious. A greater effort must be made to deliver more natural gas to communities not now receiving it. Sale of natural gas at a straight commodity rate, rather than the demand-and-commodity rate which encourages dump sales for low-grade uses, is suggested as a conservation measure. Storage in depleted fields is suggested as both a means of meeting winter peaks and of discouraging dump sales. The wide differential in gas rates charged throughout the country are pointed out as a possible source of serious sectional political issues. Rates based upon original cost and computed by charging depreciation as a percentage of such cost are unrealistic in our changing economy of higher costs, and the formulae used for depreciation by the regulatory bodies should be revised. A national fuel policy recognizing the interdependence of gas, oil and coal should be established to provide a practical, workable program for the conservation of our natural resources.

J. C. Lane

Welch, F. X. WILL SYNTHETICS REPLACE NATURAL FUELS? *Public Utilities Fortnightly* 42, 499-500 (1948) *October* 7.

Because of the subnormal price of natural gas, domestic and industrial demand for this premium fuel is high. Conversion of natural gas into synthetic liquid fuels would intensify this situation. At present no process is in sight for producing synthetic gas from coal which would be competitive with 5-cent Texas natural gas. Some doubt exists as to the future availability of "cheap" natural gas; field prices in Texas of at least 20 cents per Mcf are predicted before 1958.

C. H. Riesz

## LP-Gas

Legatski, T. W. PROPANE'S PLACE IN THE SUN. *Calif. Oil World* 41, 13, 15-16, 19, 21, 23 (1948) *October, 2nd issue.*

This paper presents the salient statistics of the liquefied petroleum gas industry for a considerable period of years and traces the increasing importance of LP-gas and propane as articles of commerce. The potential supply of LP-gases far exceeds present consumption; and, to date, mounting requirements have been met chiefly by the by-products of natural gasoline and vapor recovery operations. However, a trend toward more complete recovery of LP-gases may be expected. Possible outlets have scarcely been scratched, and vastly increased use of LP-gases is anticipated.

J. C. Lane

Ransome, R. H. COMPETITION—OR CO-OPERATION? *Gas* 24, 40-42 (1948) *November.*

The LP-gas industry now serves some 4.5 million homes, or about 20% of all homes using gas. However, competition between LP-gas distributors and gas utilities need not occur if intelligent cooperation is practiced. LP-gas distributors can serve their own interests and the interests of gas utilities by obtaining new customers in residential areas beyond present gas utility mains and holding them until the mains are extended. Such cooperation is mutually beneficial, as illustrated by the experience of Coast Counties Gas Company and the Diablo Company which have combined forces to sell gas on and off the mains to home owners in an area where electrical competition is keen.

J. C. Lane

## Natural Gas Investigation

Crosby, S. H. THE NATURAL GAS INVESTIGATION AND AFTER—2. THE FIGHT IN CONGRESS—BATTLE OF THE BILLS. *Gas* 24, 27-30 (1948) *November.*

The author presents a description of the discussions in Congress on proposed amendments to the Natural Gas Act. The Rizley-Moore Bill, the Smith-Wemberly substitute bill, and the Olds-Draper report are discussed from the standpoint of the conflicting opinions and ideology contained in each. The fact that the Federal Power Commission is internally divided on the desirability of some curb on its present broad discretionary powers is pointed out.

J. C. Lane

## Natural Gas Processing Units

Tuttle, R. B. NATURAL GAS PROCESSING UNITS ON UPGRADE, WITH 107 PROJECTS IN ACTIVE STATUS. *Oil Gas J.* 47, 88, 90-91 (1948) *November* 3.

Despite the recent completion of 18 natural gas processing plants, the number of such projects authorized, building or in the planning stage is still increasing. Currently, 107 projects are in the active class, twenty more than were reported at mid-year. The author lists the active and recently completed projects by company, location, type of project, capacity rating, status, completion schedule and contractors.

J. C. Lane

## Pipelines

Duff, D. M. COMPLETION OF MAJOR PIPE LINES WILL RELIEVE TANKER SHORTAGE. *Oil Gas J.* 47, 52 (1948) *November* 18.

The four major pipe lines now under construction in the Middle East are expected to prevent a tanker shortage such as developed last winter.

J. C. Lane

Whitelaw, H. L. WHAT'S NEW IN STEEL. *Gas Age* 102, 24-25, 64 (1948) *November* 11.

The natural gas transmission system of the country has grown amazingly and today exceeds oil pipe line mileage by more than 100,000 miles and the railroad mileage by 17,000. With the competitive prices of gas, oil and coal remaining as they are, the gas transmission system could be doubled in the next 10 years without satisfying demand. However, steel line pipe is the primary limiting factor in the expansion of the transmission system. The natural gas industry will probably receive a little less steel in 1949 than it did in 1948. The steel requirements of the nation's defense program are expected to reach a peak in 1951. The pipe producing facilities of the country are being utilized to the maximum, according to late statistics, and there has even been some expansion in pipe-producing capacity. There is every indication that there is no internal diversion of steel away from pipe-rolling facilities to other steel products. Any major expansion of pipe rolling facilities would have to start with increased iron ore production and proceed through expansion of steel-producing facilities, the cost of the latter being prohibitive at today's prices. This article contains considerable statistics on natural gas transmission lines recently constructed, authorized or pending authorization.

J. C. Lane

FPC APPROVES 3500 MILES NEW GAS LINES IN FIRST HALF OF 1948. *Pipe Line News* 20, 5-6 (1948) *October.*

The FPC authorized the construction of more than 3500 miles of new pipe line during the first six months of 1948. These lines will add some 800 MMcf per day to the natural gas delivery capacity of the nation. This article presents a summary of those projects having authorized construction costs of $700,000 or more.

J. C. Lane

## Petroleum

REPORT ON THE LONG-TERM AVAILABILITY OF PETROLEUM. *Oil Gas J.* 47, 70-72, 161 (1948) *November* 18.

This report on the long-term availability of petroleum is said to be the most comprehensive study undertaken by the oil industry in recent years. The availability of U.S. crude oil and natural-gas liquids has been estimated for the five-year period 1949-1953, and some predictions have been made concerning the availability during the following five-year period 1954-1958. Substantial increases in availability are expected during the next decade. By 1953, domestic production of crude oil and natural gas liquids is expected to increase from the present average of 5,900,000 bbls. per day to about 7,000,000 bbls. per day. Petroleum products from synthetic processes, using natural gas or coal as raw materials, are not expected to be a significant factor in the increase, probably not totaling over 30,000 bbls. per day by 1953. Production of foreign petroleum will probably increase substantially during the next five years. That in the Western Hemisphere is expected to increase from 1,750,000 bbls. per day in 1948 to 2,490,000 bbls. per day in 1953, while that in the Eastern Hemisphere, exclusive of Russia, is estimated to increase from 1,500,000 bbls. per day to 2,520,000 bbls. per day over the same period. Domestic production is not expected to decline significantly from the 1953 rate during the second five-year period, and increased foreign production will probably provide additional supplementary supplies for the United States if needed. Proved reserves of natural gas are at a relatively high ratio to consumption (about 30 to 1), and it is predicted that larger quantities of gas will be

available to supplement liquid petroleum products in supplying the nation's energy requirements.

J. C. Lane

### Prices

Pound, W. T. THE PRICE OF NATURAL GAS AS A CONSERVATION FACTOR. *World Oil* **128**, 54, 57, 60 (1948) *October.*

Low field prices for natural gas have resulted in its waste and have impeded its conservation, adversely affecting the interests of the general public as well as producers, royalty owners and the producing states. Natural gas at four cents per Mcf is the equivalent of coal at less than a dollar a ton or oil at 22 cents a barrel. Better field prices are necessary to encourage conservation, reduce waste and stimulate the discovery of new reserves.

J. C. Lane

### Space Heating

Clark, B. THE HOUSE-HEATING OUTLOOK. *Gas* **24**, 45-46 (1948) *October.*

The results of a nationwide curtailment survey covering a total of 8,361,696 meters served show that house-heating restrictions in force this year are approximately as numerous as in 1947-1948. Of the meters served, restrictions are in force on 64% as regards central heating in new homes, 67% as regards central heating in old homes, 52% as regards other space heating in new homes, and 49% as regards other space heating in old homes. The survey points out the areas in which restrictions have been lifted and the regions where the situation is still tight.

J. C. Lane

The following article, which has not been abstracted, is called to your attention:

FPC REPORTS 23,683 MILES GAS LINE BUILT OR PLANNED FROM 1945-1948. *Pipe Line News* **20**, 5 (1948) *August.*

## 2. APPLIANCES

### Appliances

Brown, J. D. THE MOST SUITABLE FORM OF GAS APPLIANCES. *Natl. Gas Bull.* (*Australia*) **12**, 30-35 (1948) *July-August.*

The author expresses his ideas as to the improvements which should be made to domestic gas appliances now in use in Australia.

E. F. Davis

APPLIANCES. *LP-Gas* **8**, 71-93 (1948) *October.*

The latest LP-gas appliances which are available for domestic, commercial, industrial and agricultural use are discussed.

E. F. Davis

### Design

Cohen, L. and Jessel, R. A NEW METHOD OF TESTING DRAFT DIVERTERS. *Gas J.* (British) **256**, 160, 163-164, 169-170 (1948) *October* 20.

A new method of testing draft diverters is described in which all the air entrained by the heater is measured for various draft conditions in the secondary flue.

E. F. Davis

### Glass Industry

Tomes, J. A. TOWN GAS IN THE HAND-BLOWN DOMESTIC GLASS INDUSTRY. *Gas J.* (British) **256**, 208, 210-216 (1948) *October.*

An elaborate description of all the applications of gas in the glass industry is given.

E. F. Davis

## Space Heating

Fuidge, G. H. DEVELOPMENT OF DOMESTIC GAS SPACE HEATING. *Gas World* (British) 124, 595-599 (1948) *October* 23; *Gas* (British) 3, 67-90 (1948) *October.*

A comparison is made of the radiation received from an open coal fire and that of an open gas fire. It is shown that the two are nearly comparable and that radiation can be increased by proper location of the radiants.

E. F. Davis

Segeler, C. G. COMBUSTION PRINCIPLES AND EQUIPMENT SELECTION IN THE USE OF GAS FOR HEATING LARGE BUILDINGS. *Heating & Ventilating* 45, 68-82 (1948) *November.*

The author outlines the factors involved in the selection of gas burning equipment for large boilers. Particular attention is given to overloading, selection of burners, combustion space required, products of combustion and recommendations for burner installation.

E. F. Davis

HOUSE HEATING TESTS SHOW SAVINGS ON ALL-GAS HOUSE OVER OIL-AND-GAS. *LP-Gas* 8, 69-72 (1948) *November.*

These tests were designed to compare the fuel costs of two identical homes, one using LP-gas for heating, the other using oil for heating. The fuel cost is practically the same.

E. F. Davis

# 3. COMBUSTION AND INDUSTRIAL FURNACES

## Burner Design

Oldright, G. L. ZINC SMELTING IN THE HORIZONTAL RETORT FIRED WITH NATURAL GAS. IV. BURNER DESIGN. *U.S. Bureau Mines Report of Investigations* 4336 (1948) *September.*

This report deals with the improvements in the method of utilizing natural gas in horizontal zinc smelting retorts in an effort to prevent slumps in recovery.

E. F. Davis

## Combustion

Lewis, B. and VonElbe, G. COMBUSTION. *Ind. Eng. Chem.* 40, 1590-1596 (1948) *September.*

The more important contributions to the literature on combustion, since the appearance in 1938 of the authors' book "Combustion, Flames and Explosions of Gases," are reviewed. A considerable increase in investigations of a fundamental nature is noted.

A. J. Rudnitzki

## Gas Turbine

Fusner, G. R. THE GAS TURBINE WITH A WASTE HEAT BOILER. *Southern Power & Ind.* 66, 66-68, 74 (1948) *November.*

The quantity of steam generated in a gas turbine waste heat boiler can be controlled so as to be independent of the power output of the turbine by either (1) throttling the turbine exhaust when running the turbine under low load so as to increase the rate of fuel consump-

tion for the given load, or (2) burning fuel at an auxiliary burner located in the waste heat boiler inlet. Curves are included for estimating the quantity of steam generated and the value of such steam at varying gas turbine power output and exhaust pressure.

C. Von Fredersdorff

## 4. CARBONIZATION AND GASIFICATION

### Changeover

Henry, H. M. SOME ECONOMIC REALIZATIONS OF HIGH BTU OIL GAS. PART I. *Gas Age* **102**, 65-68, 104, 106, 108, 110, 113-114, 116, 118, 120 (1948) *September* 30.

The Cambridge Gas Light Company has completed the conversion of its facilities from the manufacture of carburetted water gas to the production of high-Btu oil gas for meeting 100% of its daily load. The reasons for converting, the equipment required and alterations made, and details of plant operation are given in this article, which is the first part of a two-part story on the conversion.

J. C. Lane

Henry, H. M. SOME ECONOMIC REALIZATIONS OF HIGH BTU OIL GAS. PART II. *Gas Age* **102**, 27-29, 54-55 (1948) *October* 14.

The experiences of the Cambridge Gas Light Company in converting to high-Btu oil gas are reported in considerable detail, such as the changes required in various household appliances and in commercial and industrial units, the conversion cost per customer, the plan of amortization of conversion costs, and customer complaints during and after conversion. The experiences of this company will be of interest both to companies contemplating a change-over to high-Btu oil gas and to those anticipating the arrival of natural gas in their areas, since the problems of conversion appear closely akin.

J. C. Lane

### Coal Oxidation

Belcher, R. THE ANODIC OXIDATION OF COAL. PART IV. EXAMINATION OF THE ULMIC ACIDS. *J. Soc. Chem. Ind.* (British) **67**, 265-267 (1948) *July*.

A detailed examination of the ulmic acids was made. Molecular and equivalent weights were determined of both the crude acids and on the fractions obtained by acetone extraction. These weights and ultimate analyses bear a close resemblance to those of ulmic acid fractions obtained from coal by other oxidizing agents. It was found that ulmic acids reach an ultimate composition after prolonged treatment. The methods of analyses are detailed and the results are presented in tabular form. All findings are compared to previous work on ulmic acid analysis.

S. Zagnoli

Belcher, R. THE ANODIC OXIDATION OF COAL. PART V. MISCELLANEOUS EXPERIMENTS. *J. Soc. Chem. Ind.* (British) **67**, 267-269 (1948) *July*.

Numerous miscellaneous experiments were undertaken. Anthracite was oxidized at the copper cathode and much smaller yields were obtained than from a similar treatment of a vitrain. The amount of water soluble acids was much less than the ulmic acids. An attempt to oxidize two duraius in order to isolate plant remains proved unsuccessful for unless the coal was ground to pass a 240 B.S. sieve, little oxidation took place. The *beta* and *gamma* fractions of the Meltonfield vitrain were extracted by pyridine and chloroform and oxidized at the anode. The molecular weights of the products were similar to those of the ulmic acids formed by the direct oxidation of coal. This supports the theory of Briggs that the difference between fractions is one of molecular

size rather than chemical types. Both a vitrain and a sample of ulmic acids were reduced at the copper cathode. There was little change in the vitrain and no water soluble products formed. The ulmic acids foamed excessively so that the reduction had to be stopped. They showed little difference in ultimate analysis but the results are not reliable because of electrolyte adsorption. Suggestions for further work are given.

S. Zagnoli

## Coal Strength

Brown, R. L. THE MEASUREMENT OF COAL STRENGTH. *Fuel* (British) 27, 82-95 (1948) *July-August.*

A study of the factors affecting the measurement of coal strength by shatter and tumbler tests led the author to conclude that a true index of coal strength can only be obtained when the coal is sampled without causing changes due to invisible breakage that decrease strength or visible breakage that increase strength. On the basis of this study methods for the successful application of shatter and tumbler tests are outlined. Further investigation of the dependence of coal strength upon the preparation to which it is subjected is believed to be necessary to establish a basis for comparison of different coals.

H. Hakewill

## Coke Oven Plants

Wardner, W. C. HIGHER GAS PRODUCTION FROM COKE OVEN PLANTS. *Am. Gas Assoc. Monthly* 30, 30-31, 36 (1948) *October.*

See *Gas Abstracts* 4, 122 (1948) *July* for abstract.

## Distribution

James, L. S. INSTRUMENTATION AND AUTOMATIC CONTROL. *Gas World* 129, 192-199 (1948) August 7.

The author discusses the measurements of pressure flow rates, and holder stocks at various points in a distribution system. The relative advantages and disadvantages of orifice plates, venturi tubes, or pitot tubes as measuring elements are discussed in some detail. The advantages to be gained by transmission of measurements to central control points are emphasized.

B. E. Hunt

## Ethylene Recovery

Schuftan, P. M. and Phil, D. A NEW PROCESS FOR THE RECOVERY OF ETHYLENE FROM COKE OVEN GAS. *Chem. & Ind.* 1948, 99-103, *February* 14.

Coke oven gas, after purification from tar, ammonia, naphthalene and possibly benzole, is compressed and passed to regenerators wherein cooling and almost complete condensation of water vapor, HCN, $H_2S$, $CO_2$ and hydrocarbons of more than two carbon atoms occurs. At the same time about 40% of the ethane and 20-25% of the ethylene is retained. Practically all of the remaining ethylene is condensed in tubular heat exchangers, after which the remaining ethylene-free gas is expanded in a turbine which supplies approximately two-thirds of the refrigeration requirements of the process. The expanded gas is reheated in a second tubular heat exchanger and regenerator and is returned to the coke ovens. The portion of the impure ethylene liquefied in the tubular heat exchanger is processed through a series of distilling columns where yields of methane, ethane and ethylene are obtained. Ethylene obtained by this process is said to compare favorably with competitive processes such as oil cracking.

C. Von Fredersdorff

## Holders

THE USE OF FLAME CLEANING IN PAINTING GASHOLDERS. *Gas Times* (British) 57, 31-34 (1948) *October* 8.

A detailed discussion of the steps taken in the painting of a gasholder is presented. The surface was prepared by cleaning with an oxy-acetylene torch. The advantages for flame cleaning are said to be: (1) removal of moisture from the surface; (2) removal of corrosion products; (3) removal of scale; (4) prevention of dust settling on the surface to be painted. Photographs showing the various stages of operation are presented, and the properties of various types of paints are discussed.

W. J. Merwin

## Machinery

Harrison, H. C. SOME NEW TYPES OF MECHANICAL EQUIPMENT. *Gas Times* (British) 57, 45-46 (1948) *October* 8.

See Gas *Abstracts* 4, 211 (1948) *November* for abstract.

## Peak Load

Barthel, D. E. SAFE MAINTENANCE AND OPERATION OF STANDBY PLANTS. *Gas Age* 102, 19-20, 54, 56 (1948) *July* 22.

The inherent hazards resulting from infrequency of operation, rich gas produced, and difficulty in properly training personnel during short periods of operation, the safe maintenance and and operation of standby plants are discussed. Good housekeeping, proper building and equipment construction, competent personnel, constant inspection, and high quality maintenance are particularly stressed.

C. Von Fredersdorff

Cheetham, H. S. THE USE OF HYDROCARBON OIL IN THE MANUFACTURE OF TOWN GAS. *Gas World* (British) 129, 507-510 (1948) *October* 2.

The use of oil for primarily peak load purposes is described for a carburetted water gas plant of 18000 Mcf/day operating 80% of capacity for base load. The general status of carburetted water gas plants as a means for peak load gas production is compared with other peak load processes including the Dayton oil gas, Jones oil gas, twin generator oil gas and LP-gas-air mixtures.

C. Von Fredersdorff

## Producers

Brzozowski, T. J. RECENT TRENDS IN GAS-PRODUCER PRACTICE. *Bull. Brit. Coal Utilization Research Assoc.* 12, 237-244 (1948) *July.*

Although no great developments in the design of fixed bed producers have taken place in recent years, improvements in operation were achieved by mechanical feeding and feed distributing devices, mechanical ash removal and additional instrumentation. Rotating-shell producer designs permit the use of non-uniformly sized caking coal while other types of producers operating with non-caking fuels (such as the Wellman-Galusha producer and the Power Gas Corporation producer) have automatic fuel bed level control. Interest has been shown in: (1) instrumentation of a producer for automatic adjustment to demand; (2) pre-heating of the blast air and the use of additional steam; and (3) gasification with steam-oxygen blast. Among the recently developed European gas generators and producers are: (1) Lurgi pressure generator using brown coal as fuel for conversion to a methane rich 450 Btu gas after $CO_2$ removal; (2) Würth slagging producers for the gasification of fuels containing an ash of low fusion point; (3) Winkler generator for the gasification of coal fines (approx ⅛ in) in a moving bed; (4) Koppers coal dust gasifier using oxygen-steam mixtures for the production of synthesis gas; (5) Imperial Chemical

Industries ICI fluidized gas generator for the continuous carbonization and air-steam-oxygen gasification of coal fines resulting in three separate gases namely; coal gas part of which is recycled, producer gas and water gas; and (6) Pintsch-Hillebrand water-gas generator employing 1300°C steam for the production of a gas which can be carburetted and sold as city gas.

C. Von Fredersdorff

## Pulverized Coal

Humphreys, C. G. R. EARLY DEVELOPMENTS IN PULVERIZED COAL FIRING. PART 2. *Combustion* **20**, 44-48 (1948) *October.*

A summary of developments during the period 1913 to 1923 in the firing of boilers by pulverized coal is given. Early experimental success in burning pulverized coal prompted industrial boiler installations of horizontal and vertical tube construction by such pioneer companies as Milwaukee Electric Railway and Light Company and Ford Motor Company. Schematic diagrams of early boiler installations and a list of companies using pulverized coal firing are included.

C. Von Fredersdorff

## Synthesis Gas Production

Reed, R. M. and Eriksen, A. HYDROGEN AND SYNTHESIS GAS PRODUCTION. *Petroleum Engr.* **20**, 278, 280, 282, 284, 290 (1948) October.

See *Gas Abstracts* **4**, 193 (1948) *October* for abstract.

Schmidt, L. D., McGee, J. P. and Slone, M. C. A PILOT PLANT FOR GASIFYING POWDERED COAL ENTRAINED IN OXYGEN AND STEAM. *Chem. Eng. Progress* **44**, 737-744 (1948) *October.*

Construction of a pilot plant for the production of low cost synthesis gas from coal is being completed by the U.S. Bureau of Mines, Morgantown, West Virginia. Pulverized coal, entrained in a stream of $CO_2$ or steam, is to be introduced tangentially to a circular refractory lined gasification chamber. Highly superheated (4000°F design temperature) steam obtained by a specially designed Royster pebble heater together with room temperature oxygen from a Linde-Frankl oxygen generator are also introduced tangentially to the gasification chamber at a point near the coal inlet. The heat of reaction of carbon and oxygen and the sensible heat in the steam are expected to be sufficient to supply the overall endothermic heat of reaction and heat losses by radiation and convection in the generator. The make gas is withdrawn from the top of the generator; passes through a hot coke bed (to insure against unreacted oxygen in case of failure of coal supply) is cleaned by alloy steel cyclones; enters a spray tower, seal pot, packed tower, and a final water spray. Provision is made in the generator for the withdrawal of ash and slag either through small taps or a cleanout door located at its base. Ports located around the periphery of the generator shell allow for sight pyrometer readings, thermo-couple inserts and gas sampling. The principal instrumentation consists of two Askania regulators for air to gas ratio to the pebble heaters, several automatic valves for control of pressure in the gasification chamber and pebble heaters and a photoelectric relay to shut off oxygen flow in the event of failure of coal delivery. Data secured from the operation of this plant are to be used in evaluating (1) the use of highly superheated steam as a substitute for oxygen, (2) the cost of oxygen production, and (3) the cost of synthesis gas.

C. Von Fredersdorff

The following article, which has not been abstracted, is called to your attention:

Van Dyke, B. H. OXYGEN BY ATMOSPHERIC PRESSURE DISTILLATION. *Chem. Ind.* **63**, 604-608 (1948) *October.*

# 5. NATURAL GAS AND NATURAL GAS CONDENSATES

## Activated Carbon

Emmett, P. H. ADSORPTION AND PORE-SIZE MEASUREMENTS ON CHARCOALS AND WHETLERITES. *Chem. Revs.* 43, 69-148 (1948) *August.*

The author discusses studies on "ideal" charcoal. Topics covered in this article are: measurements of surface areas, adsorption of water vapor, pore size and pore-size measurements, pore-size alteration, oxygen surface complexes on charcoals, special surface coatings on charcoal, relation between adsorption and molecular structure, retentivity of charcoals, chemisorption on the cupric oxide in type A whetlerites, and the structure of charcoal. There are 157 references included in this article.

M. C. Miyaji

## Conservation

Duff, D. M. 85 MILLION CUBIC FEET OF CASINGHEAD GAS DAILY UTILIZED BY SHELL IN TWO NEWLY COMPLETED PLANTS. *Oil Gas J.* 47, 90-91 (1948) *October* 21.

Expansion of facilities by Shell and cooperating companies at two sites in West Texas have added to the casing-head gas being conserved and liquid products being recovered. Present production and that slated for the near future are stated.

J. D. Parent

## Distribution

LaViolette, W. A. LARGE VOLUME AUTOMATIC PRESSURE REGULATION. *Gas Age* 102, 73-76, 126, 128, 130 (1948) *September* 30.

The problem of accommodating extreme variation in load demands on distribution mains is solved by employing several motorized valves connected in parallel and regulated by a pressure controller.

E. F. Davis

## Hydrogen Sulfide Determination

Kosior, K. E. A. DETERMINATION OF HYDROGEN SULFIDE IN NATURAL GAS. *Can. Chem. & Process Ind.* 32, 925-926, 929 (1948) *October.*

A simple reliable method is described for the quantitative determination of low concentrations of $H_2S$ in raw or scrubbed natural gas. This method is based upon the reaction of p-amino-dimethylaniline with $H_2S$ to form methylene blue, which is examined by visual comparison with standard solutions or by means of a photoelectric colorimeter. $H_2S$ concentrations as low as 0.02 grains per 100 cu ft of gas may be determined employing a one cu ft gas sample. Sensitivity may be increased by taking a larger volume of sample for the test. Methyl and ethyl sulfides, mercaptan, and nitrogen do not interfere with $H_2S$ determination by this procedure; but $CO_2$ causes small color losses when seeking very low $H_2S$ concentrations.

H. Hakewill

## Peak Load

Dade, L. E. PEAK SHAVING CONTROL. *Gas Age* 102, 28, 64 (1948) *November* 11.

The procedure for estimating gas loads used by the Central Electric and Gas Company of Lincoln, Nebraska, is discussed. Heating load demands for previous years are plotted against degree days, curves being constructed for the average demand, the average maximum, and the average minimum. These curves are used by the dispatcher to estimate when curtailments should begin and when peak load plants should be placed into operation.

C. H. Riesz

## Production

Curran, B. E. COMBINATION CASING STRINGS. *Oil Gas J.* **47**, 80-84, 105 (1948) *October* 14.

The author gives a detailed illustration of how to select casing strings which are sufficiently strong to withstand collapsing due to external pressure and which are strong enough to resist failure by tension. A table is presented wherein calculated values of parameters for the most frequently used combination of weights and grades of casing are listed. By the use of the author's method, trial and error calculations are eliminated.

W. J. Merwin

## Purification

Weitzel, H. R. COMBINATION SCRUBBING, DEHYDRATION, DESULFURIZATION PLANT. *Gas Age* **102**, 77, 120, 122, 124 (1948) *September* 30.

A scrubbing system for gas purification is described that will process 18 MMcf of gas per day. The central part of the plant is a bubble cap absorption tower for removal of hydrogen sulfide and water by countercurrent contacting of the gas with a solution containing 45% diethylene glycol, 50% diethanolamine, and 5% water. The concentrated solution is filtered free of dirt and dust and then reconcentrated in a fractionating tower, $H_2S$ from the top of the tower being sent to a flare. The advantage of dehydrating on the suction side of the compressors, due to the lower gas temperature, is shown by calculation of the dew point of the purified gas processed under suction side conditions and under discharge side conditions.

C. L. Tsaros

## Reserves

Gruy, H. J. and Crichton, J. A. A CRITICAL REVIEW OF METHODS USED IN THE ESTIMATION OF NATURAL GAS RESERVES. *Petroleum Engr.* **20**, 208, 211, 214, 216, 218, 220 (1948) *October.*

See *Gas Abstracts* **4**, 174 (1948) *September* for abstract.

## Sampling

Reeves, A. A. CONTINUOUS COLLECTOR SAMPLES GASES IN PROPORTION TO MAIN LINE FLOW. *Chem. Eng.* **55**, 130 (1948) *October.*

The apparatus described permits collection of a continuous composite sample of a gaseous mixture whose rate of flow and composition varies with time. A capillary orifice passes a proportional amount of the flow through the main orifice and essentially the same pressure drop is maintained across the sample orifice and the main orifice. The gas is displaced by a saturated lime solution. The only materials of construction needed are two 55 gallon drums, some ¼ inch copper tubing, three entrainment knock-out pots and some small diameter glass tubing. A sketch of the apparatus is presented.

S. A. Zagnoli

## Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. PART IV-NO. XXXV IN A SERIES. *Gas Age* **102**, 32-37 (1948) *October* 14.

The economic advantage of using large diameter, thin walled, high strength line pipe is pointed out.

J. D. Parent

Miller, B. TRANSPORTATION SYSTEM CALCULATIONS—PART IV-NO. XXXVI IN A SERIES. *Gas Age* **102**, 51-54, 56 (1948) *October* 28.

Aggregate horsepower requirements for a long line are said to be a minimum when the compression ratio is 1.25. This is related to the decrease in efficiency as the compression ratio approaches unity. Axial flow and centrifugal compressors are assumed to have fixed efficiencies of 84% and 70% respectively. It is also stated that line pipe should be as wide as possible.

J. D. Parent

### Water Treatment

Ulmer, R. C. and Churchill, J. F. pH CONTROL THROUGH USE OF A SULFUR BURNER. *Oil Gas J.* **47**, 111-112, 115 (1948) *November* 25.

See *Gas Abstracts* **4**, 215 (1948) *November* for abstract.

## 6. PETROLEUM AND SYNTHETIC LIQUID FUELS

### Corrosion

Gross, W. F. and Andrews, H. W. PREVENTION OF CORROSION IN SOUR WELLS WITH ORGANIC INHIBITORS. *Oil Gas J.* **47**, 76-79, 113-114 (1948) *October* 28.

The authors present the results of a controlled 18-month field test of four commercial organic corrosion inhibitors in sour West Texas oil wells. The tests were made using metal coupons at the well head and joints and rods in the well proper. The results indicate that after an initially large application of inhibitor the subsequent applications may be reduced appreciably without decreasing the protection provided.

B. E. Hunt

### Catalytic Cracking Unit

Kelso, G., Peavy, C. D., Myers, G. D. and Hoge, A. W. DESIGN AND OPERATION OF LEONARD TCC UNIT. *Petroleum Engr.* **20**, 293-294, 296, 298, 300 (1948) *October.*

See *Gas Abstracts* **3**, 167 (1947) *October* for abstract.

### Naphtha Polyforming

Goldtrap, W. A. and Jones, E. L. SELF-CONTAINED NAPHTHA POLYFORMING CORRELATION. *Petroleum Engr.* **20**, 269-272 (1948) *October.*

In self-contained naphtha polyforming, the liquefied gases, mainly propane, are recycled at a ratio of about 1:1 to the thermal cracking cost. Data obtained from a decade of plant operation by the Phillips Petroleum Company are correlated with pilot plant data reported in the literature. Gasoline yields are substantially independent of pressure but the octane number improvements vary directly with pressure.

C. H. Riesz

Offutt, W. C., Fogle, M. C., and Beuther, H. UTILIZATION OF REFINERY GASES BY THE POLYFORM PROCESS. *Petroleum Refiner* **27**, 105-111 (1948) *October.*

Recirculation of liquefiable petroleum gases in thermal reforming of naphthas improves the yield and quality of the gasoline produced. Addition of $C_3$, $C_4$-gases from outside sources increases the gasoline yield substantially, best results being obtained with highly olefinic gases. Various correlations presented indicate the flexibility of the Polyform process to meet changing economic conditions.

C. H. Riesz

## Synthetic Gasoline Purification

Helmers, C. J., Clark, A. and Alden, R. C. CATALYTIC TREATMENT OF SYNTHETIC GASOLINE. *Oil Gas J.* **47**, 86, 89, 91, 92 (1948) *October* 28.

Gasoline synthesized from carbon monoxide and hydrogen in a pilot plant utilizing fluidized iron catalyst was treated by the Perco process for the elimination of oxygen-containing compounds. Octane number (motor method) was increased from 60 to nearly 74. Study of the treated product reveals it to be more stable and lighter in color as well. Octane number improvement is due in large part to a shifting of the double bond from a terminal position toward the center of the hydrocarbon molecule. In the untreated material 50 to 75% of the olefins present (75-80%) are in the terminal position. In the treated product, only a small percentage of 1-olefins can be detected. Little chain branching occurred along with the double-bond shift.

C. H. Riesz

## Synthol Analysis

O'Connor, B. SILICA GEL PERCOLATION. *Ind. Eng. Chem.* **40**, 2102-2103 (1948) *November.*

Silica gel percolation may be used as a laboratory tool for study of compound types present in synthol, a product of a modified Fischer-Tropsch synthesis. Compounds of similar boiling point are separated according to their adsorption affinity with silica gel which increases in the following order: paraffins, olefins, aromatics, oxygenated compounds. Use of an azo dye enhances the differentiation of aromatics and oxygenated compounds. The utility of the method is indicated for determining classes of compounds, separation of the various classes in small batches and determination of oxygenated compounds.

C. H. Riesz

The following articles, which have not been abstracted, are called to your attention:

Egloff, G. PRODUCTS FROM PETROLEUM HALOGENATION. *Oil Gas J.* **47**, 112-114 (1948) *October* 14.

Howard, F. A. SYNTHETIC FUELS. *Combustion* **20**, 47-50 (1948) *November.*

# 7. ANALYTICAL METHODS AND TESTS

## Coal Hydrogenation Products

Basu, A. N. and Glenn, R. A. CHEMICAL NATURE OF COAL HYDROGENATION PRODUCTS. II. PROGRESS IN FURTHER CHROMATOGRAPHY OF PRIMARY COAL HYDROGENATION PRODUCTS ON SILICA GEL. *Fuel* (British) **27**, 96-99 (1948) *July-August.*

The pentane soluble fraction of the combined Bands III and IV (the most highly condensed aromatic compounds, with the oxygen, nitrogen and sulfur compounds) from the chromatography of liquid coal hydrogenation products have been separated further by re-chromatographing on silica gel. Acetylatable compounds were found to be concentrated at the top of the column. Oxygen and nitrogen compounds were distributed throughout the column. With silica gel-pentane chromatography of the pentane soluble portion of Bands III and IV, a concentration of some of the oxygen compounds in a non-acetylatable form was obtained. Tables of data, schematic diagrams, and graphs are presented.

M. C. Miyaji

## Electric Furnace

Ungnade, H. E. and Zilch, K. ELECTRIC FURNACE FOR SEMIMICROANALYSIS OF CARBON AND HYDROGEN. *Anal. Chem.* **20**, 996 (1948) *October.*

A furnace is described to carry out semi-micro-analysis of carbon and hydrogen. The furnace is 33 cm in length and the combustion tube is a standard Pyrex 172 microcombustion tube about 11 mm outside diameter. The results obtained were within $\pm 0.1\%$ of the theoretical values.

M. C. Miyaji

## Elemental Analysis

Wear, G. E. C. and Quiram, E. R. MODIFIED BURNERS FOR ELEMENTAL ANALYSIS BY LAMP COMBUSTION AND THEIR APPLICATION TO SPECIAL PROBLEMS. *Oil Gas J.* **47**, 283-285 (1948) *November* 11.

The design and application of burners for the determination of sulfur, halogens, carbon, and hydrogen in volatile, nonvolatile, and aromatic materials is presented. It is claimed that the modified burners are capable of yielding chlorine analyses within 2 to 5% of the amount present, bromine analyses within 10 to 20%, carbon analyses within 2%, and quantitative hydrogen analyses.

H. Hakewill

## Mixtures

Ash, S. H. and Felegy, E. W. ANALYSIS OF COMPLEX MIXTURES OF GASES. *U.S. Bureau of Mines Bull.* 471, 1948.

This is a report of the investigations of the Federal Bureau of Mines on fires and explosions in mines, tunnels, buildings, and hazardous industrial processes. The purpose of the report is to point out what the mine-management official, the safety engineer, and the chemist can do to utilize analyses of complex gas mixtures as a basis for safe procedure to control and extinguish fires and to prevent explosions. The development of mathematical relationships between gas composition and explosibility and other important characteristics are given with numerous examples of the application of the formulas to practical situations. A set of charts expressing these relationships are included for the reader's use.

H. Hakewill

Robey, R. F. and Wiese, H. K. CHEMICAL ANALYSIS OF REFINERY $C_5$ HYDROCARBON FRACTIONS. *Anal. Chem.* **20**, 926-933 (1948) *October.*

A systematic procedure was designed to define the composition of $C_5$ fractions in terms of the individual components, which include: neopentane, isopropylethylene, isopentane, 1-pentene, 2-methyl-1-butene, isoprene, n-pentane, 2-pentenes, trimethyl-ethylene, cyclopentadiene, trans-piperylene, cis-piperylene, cyclopentene, and cyclopentane. The conjugated diolefins, tertiary mono-olefins, total unsaturated hydrocarbons, and total saturated hydrocarbons are determined through established analytical methods for these components. The analysis and stability of the individual diolefins, isoprene, cyclopentadiene, and cis- and trans-piperylenes are considered in detail. A colorimetric method employing mercuric acetate reagent determines isoprene. The mean deviation of the determined value from the known value in a synthetic mixture is less than 1%, based on total sample.

M. C. Miyaji

## Nitrogen Determination

Buchanan, B. B., Grimes, M. D., Smith, D. E. and Heinrich, B. J. DETERMINATION OF NITROGEN IN VOLATILE ORGANIC COMPOUNDS BY SEMIMICRO-DUMAS METHOD. *Oil Gas J.* **47**, 286 (1948) *November* 11.

A modified semimicro-Dumas method intended

for the determination of nitrogen in volatile organic liquids and in solid organic samples is described. Special procedures were devised for introducing liquid sample, free from air, into a sample bulb, and for breaking the sample bulb inside the combustion tube after all the air has been swept out with $CO_2$. Accuracy and precision of the method are demonstrated by check results obtained for the analyses of six different organic compounds containing nitrogen.

H. Hakewill

## Oxygen Determination

Brady, L. J. DETERMINATION OF SMALL AMOUNTS OF OXYGEN IN GASES. *Anal. Chem.* **20**, 1033-1037 (1948) *November.*

This procedure for the determination of oxygen content of nitrogen, argon, acetylene, and mixtures of CO, $CO_2$, and nitrogen, having oxygen contents ranging from 0.1% to less than 0.001%, is based on the quantitative reaction of oxygen with sodium anthraquinone-*beta*-sulfonate in the reduced state. The amount of oxygen reacting is found by measurement of the optical density of the red-colored anthraquinone reagent by means of a photo-electric colorimeter. Hydrocarbons, phosphine, or sulfur compounds in small quantities do not interfere with the analysis for oxygen. Spot or continuous determination of oxygen concentration in a gas stream are possible with equipment arranged according to a flow diagram and picture that is included in the article.

H. Hakewill

## Oxygen Removal

Meites, L. and Meites, T. REMOVAL OF OXYGEN FROM GAS STREAMS. *Anal. Chem.* **20**, 984-985 (1948) *October.*

The authors describe the advantages of vanadyl sulfate solution for oxygen removal from gas streams. Polarographic measurements for the presence of oxygen in gas streams before and after treatment for its removal were made to demonstrate the efficiency of the vanadyl sulfate reagent.

H. Hakewill

## Sulfur Determination

Kehl, W. L. and Hart, J. C. QUANTITATIVE DETERMINATION OF SULFUR IN HYDROCARBONS BY X-RAY ABSORPTION. *Oil Gas J.* **47**, 273-274 (1948) *November* **11.**

The use of a Geiger counter X-ray spectrometer to determine the sulfur content of "crudes" by means of X-ray absorption is described. A carbon absorption curve and a sulfur calibration curve are presented, which make possible the analysis of hydrocarbons for sulfur content when the specific gravity and the intensity of transmitted X-radiation are known for the sample being tested. While the analysis requires only a few minutes time to perform, its application is limited to relatively pure hydrocarbons, i.e., hydrocarbons containing only carbon, hydrogen, and sulfur.

H. Hakewill

Lane, W. H. LAMP METHOD FOR QUANTITATIVE DETERMINATION OF TOTAL SULFUR. *Anal. Chem.* **20**, 1045-1047 (1948) *November.*

A critical study of the lamp method for sulfur determination was conducted. From the results obtained in tests with synthetic mixtures containing a known quantity of elemental sulfur, thiophenol, thiophene, or carbon disulfide it was concluded that: (1) the lamp method gives low and erratic recovery of elemental sulfur present in organic solutions; (2) the rinsings from the chimney of the apparatus contain appreciable sulfur; (3) the use of Pyrex wool wicks improves sulfur recovery; and (4) the recovery of volatile organic sulfur com-

pounds is complete only when burned with a nearly nonluminous flame, which condition may be achieved by dilution with an alcohol such as isopropanol.

H. Hakewill

Pepkowitz, L. P. VOLUMETRIC DETERMINATION OF MICROGRAM QUANTITIES OF ACID-SOLUBLE SULFUR. *Anal. Chem.* 20, 968-970 (1948) *October.*

A procedure for determining acid-soluble sulfide on the microgram scale is presented. The sulfur is distilled as hydrogen sulfide from acid solution and absorbed in a measured excess of calcium hypochlorite. The sulfide is oxidized to sulfate and the excess hypochlorite determined iodometrically. Stoichiometric relationships are not borne out experimentally. Quantitative results are obtained by determining titer values of reagents against known quantities of sulfide.

Author's abstract

## Water Vapor Determination

Cherry, R. H. DETERMINATION OF WATER VAPOR. *Anal. Chem.* 20, 958-962 (1948) *October.*

The application of thermal conductivity for the quantitative determination of water vapor in gaseous mixtures is described. The method has been demonstrated for water vapor in air, nitrogen, and oxygen; and theoretical considerations indicate that the method could also be applied to water vapor in carbon monoxide, acetylene, ethene, and ethane. The instrumentation and calibration of the apparatus employed for thermal conductivity measurements are discussed, and the features of the method are described.

H. Hakewill

# 8. GENERAL AND PHYSICAL CHEMISTRY

## Adsorption

Joyner, L. G. and Emmett, P. H. DIFFERENTIAL HEATS OF ADSORPTION OF NITROGEN ON CARBON BLACKS. *J. Am. Chem. Soc.* 70, 2353-2359 (1948) *July.*

The adsorption isotherms for nitrogen on two carbon blacks were measured in the liquid air temperature region and the differential heats of adsorption were obtained. The free energy change and the entropy change in the passage of nitrogen from the liquid to the adsorbed state were determined. Application of the Brunauer-Emmett-Teller theory to the systems for the determination of surface area is described.

S. Katz

Savage, R. H. and Brown, C. CHEMICAL AND PHYSICAL ADSORPTION OF GASES ON CARBON DUST. *J. Am. Chem. Soc.* 70, 2362-2366 (1948) *July.*

Carbon dust, formed by wearing graphite rods away against a rotating copper surface was found to possess unusual surface activity. $H_2$, $O_2$, $N_2$, CO, $CO_2$ and $CH_4$ are adsorbed irreversibly at room temperature, the hydrogen adsorption being 10 times that possessed by standard activated charcoals. The total surface of the graphite dust was comparable with that of the best activated carbons. About 1% of the surface showed irreversible adsorption. An explanation based on the formation of mechanical formation of strong centers of unsaturation is proposed.

S. Katz

## Adsorption–Swelling

Maggs, F. A. P. THE ADSORPTION-SWELLING OF SEVERAL CARBONACEOUS SOLIDS. *Trans. Faraday Soc.* (British) **42B**, 284-288 (1946).

Extent of swelling of an unactivated willow charcoal due to adsorption of methanol was found to be proportional to the pressure of the liquid film formed in its inner surfaces; however, coal, due to the formation of Griffith cracks, showed a complex relation between the extent of swelling and the surface film pressure. The coal also showed a proportionality between volume of adsorption of methanol and volume of swelling. This can also be explained in terms of Griffith cracks which causes weakening of the structural rigidity of the solid coal surfaces.

S. Mori

## Detoxification of Catalyst Poisons

Maxted, E. B. STUDIES IN THE DETOXICATION OF CATALYST POISONS. PART VI. USE OF REVIVABLE FILTER-COLUMN. *J. Chem. Soc.* (British) **1948**, 1091-1093, *August.*

Detoxification of benzene which contains thiophene has been accomplished by a two-step procedure. The thiophene is hydrogenated in the first steps to thiophane, which, though toxic, is readily oxidized to thiophane sulfone, the second step of the process. As an alternative, impure benzene can be freed from thiophene by adsorptive means, the poison being removed by a column of platinum black hydrogenation catalyst. Poisons adsorbed on the fouled catalyst can be hydrogenated, oxidized and removed. The revivified catalyst can then be reused as an adsorptive filter. The process apparently can be repeated many times.

C. H. Riesz

Maxted, E. B. and Walker, A. G. STUDIES IN THE DETOXICATION OF CATALYST POISONS. PART VII. THE SELF-POISONING EFFECT IN THE HYDROGENATION OF PYRIDINE. *J. Chem. Soc.* (British) **1948**, 1093-1097, *August.*

The influence of the electronic state of the nitrogen atom in the hydrogenation of pyridine has been considered from the standpoint of catalytic toxicity. Pyridine, by virtue of a free electron pair on the nitrogen atom, is strongly adsorbed by a metallic catalyst and its hydrogenation occurs at a considerably lower rate than that of benzene. The corresponding pyridinium compound containing a shielded nitrogen atom should, on this basis, be non-toxic. These views are supported by the following experimental evidence. Free pyridine was demonstrated to be a poison for the hydrogenation of cyclohexene, toxicity being about one-tenth that of thiophene. Pyridine thus might be expected to act as a poison in its own hydrogenation. The hydrogenation of sulfur-free pyridine was raised to eight times its normal value by the addition of aqueous acid in such a way as to provide a pyridinium ion in place of free pyridine. Dry ammonia was shown to be a poison for the hydrogenation of cyclohexane; aqueous ammonia and ammonium salts are known to be non-toxic.

C. H Riesz

## Electron Microscopy

Ellis, S. G. OIL INDUSTRY USES FOR ELECTRON MICROSCOPY, PART II. *Petroleum Refiner* **27**, 115-119 (1948) *September.*

The second paper in this series discusses the use of the electron microscope in the study of greases, asphalts and catalysts. The use of electron and X-ray diffraction to supplement the electron microscope is discussed and future trends in the field are forecast.

S. Katz

## Explosion Initiation

Bowden, F. P. and Gurton, O. A. INITIATION OF EXPLOSIONS BY GRIT PARTICLES. *Nature* (British) **162**, 654-655 (1948) *October* 23.

The effectiveness of grit particles in the initiation of solid explosives by friction or impact depends on the melting point of the grit. For the explosives studied the minimum melting point required for initiation is in the range 400°-500°C.

A. J. Rudnitzki

## Fugacities

Joffe, J. FUGACITIES IN GAS MIXTURES. *Ind. Eng. Chem.* **40**, 1738-1741 (1948) *September.*

A method of calculating fugacities of the components of a mixture has been developed, and an exact thermodynamic relation has been derived for the fugacity of a gaseous mixture and its components. Application of the procedure to several binary systems show closer agreement with experimental data than methods in the earlier literature, especially at pressures above 30 to 50 atmospheres.

S. Katz

## Inflammability Limits

Burgoyne, J. H. and Williams-Leir, G. LIMITS OF INFLAMMABILITY OF GASES IN THE PRESENCE OF DILUENTS. A CRITICAL REVIEW OF DATA. *Fuel* (British) **27**, 118-125 (1948) *September-October.*

The recent literature has been reviewed and a critical tabulation of the data on inflammability limits of gases and vapors in admixture with inert diluents has been compiled. This work brings up to date the review published by Coward and Jones in 1938.

A. J. Rudnitzki

## Isooctane Properties

Beattie, J. A. and Edward, D. G. THE VAPOR PRESSURE, ORTHOBARIC DENSITIES AND CRITICAL CONSTANT OF 2, 2, 4-TRIMETHYLPENTANE. *J. Am. Chem. Soc.* **70**, 3382-3384 (1948) *October.*

Data on the vapor pressures, the orthobaric densities, and increase in pressure with volume decrease have been obtained between the temperatures of 100 to 250° C for isooctane of high purity. Critical constants were also obtained from the P-V-T data near the critical point by plotting isotherms on a P-V graph. This method gave an uncertainty of 3% for the critical volume and density.

S. Mori

## Kinetics

Hougen, O. A. APPLIED KINETICS AND EQUILIBRIUM. *Ind. Eng. Chem.* **40**, 1556-1565 (1948) *September.*

A brief but thorough review of the literature of chemical kinetics and chemical equilibria, in their application to the engineering of process designs is given. A very complete bibliography of over four hundred reference books and papers is included.

S. Katz

## Particle Size

Rose, H. E. and French, C. C. J. ON THE EXTINCTION-COEFFICIENT: PARTICLE SIZE RELATIONSHIP FOR FINE MINERAL POWDERS. *J. Soc. Chem. Ind.* (British) **67**, 283-288 (1948) *July.*

In this work a short account is given of researches into the measurement of the size characteristics of mineral powders by photo-extinction methods which have led to an experi-

mentally derived curve relating the extinction coefficient for a suspension to the size of particle of the material in suspension, for the size range 0-50 microns. While it is not claimed that the validity of this curve is rigidly established, it is believed that it is considerably more reliable than any previously suggested and to have an accuracy sufficient for many industrial purposes.

Authors' abstract

## Polymer Decomposition

Wall, L. A. MASS SPECTROMETRIC INVESTIGATION OF THE THERMAL DECOMPOSITION OF POLYMERS. *J. Research Natl. Bur. Standards* 41, 315-322 (1948) *October.*

The determination of the products of the thermal decomposition of polymers with the mass spectrometer is described. The method employs a very small sample of material and yields extensive qualitative and quantitative information of the decomposition products.

S. Katz

## Thermal Properties of Petroleum Oils

Van Winkle, M. THERMAL PROPERTIES OF PETROLEUM OILS. PART III—EFFECT OF PRESSURE ON ENTHALPY OF PETROLEUM VAPOR. *Petroleum Refiner* 27, 105-107 (1948) *August.*

This is the third article in a series which presents correlations of thermal properties of petroleum oils with their API gravity and their distillation and flash vaporization data. In this final article the effect of pressure on the enthalpy of petroleum vapor is correlated with reduced temperature and pressure. These two functions can in turn be evaluated graphically from the API gravity, the ASTM distillation and the flash vaporization curve.

H. R. Linden

## Vapor — Liquid Equilibria

Li, Y. M. and Coull, J. THE PREDICTION OF VAPOR-LIQUID EQUILIBRIA FOR TERNARY MIXTURES FROM THE DATA OF BINARY SYSTEMS. *J. Inst. Petroleum* (British) 34, 692-704 (1948) *September.*

Activity coefficients of components of binary and ternary solutions are discussed. If a number of restrictions apply, liquid-vapor equilibria for ternary solutions can be predicted on the basis of data for binary mixtures.

J. D. Parent

## Vapor Pressure Curves

Korvezee, A. E. and Dingemans, P. MAXIMA IN VAPOR PRESSURE CURVES. *J. Am. Chem. Soc.* 70, 2818 (1948) *August.*

An equation is presented which purports to correlate the melting point of a salt with the temperature at which a maximum in the vapor pressure occurs for saturated aqueous solutions.

B. E. Hunt

## 9. ORGANIC CHEMISTRY

### Alkylation

Francis, A. W. LIQUID-PHASE ALKYLATION OF AROMATIC HYDROCARBONS. *Chem. Revs.* **43**, 257-269 (1948) *October.*

Liquid phase alkylation is reviewed mainly from the aspect of product distribution. It is concluded that the anomalous formation of polyalkylbenzenes is caused by solvent extraction of the initial reaction products into the catalyst layer. This condition can be avoided by control of the physical variables to provide adequate contact among the two reagents and catalyst. It is also concluded that alkylation is extremely rapid and non-reversible and that alkyl groups have negligible effect upon the rate of further alkylation. Variations in the distribution of products with different catalysts are reconciled. 79 references.

C. H. Riesz

Schmerling, L. ALUMINUM CHLORIDE SOLUTIONS IN NITROPARAFFINS. *Ind. Eng. Chem.* **40**, 2072-2077 (1948) *November.*

Anhydrous aluminum chloride dissolves readily in nitromethane, nitroethane and the two nitropropanes yielding solutions which are catalytically active. Since these solutions are miscible with benzene, homogeneous liquid phase alkylation may be accomplished. Alkylation of benzene with propylene, propyl chlorides, cyclopropane, ethylene, and diisobutylene is described. The active component of the solution is the addition complex, $AlCl_3 \cdot RNO_2$. The nitroparaffin solutions of aluminum chloride although not soluble in paraffins may be used for the alkylation of isoparaffins with olefins. Data for the alkylation of isobutane with propylene are discussed. The nitroparaffin solutions of aluminum chloride effected virtually no isomerization of n-pentane or methylcyclopentane.

C. H. Riesz

### Hydrocarbon Standardization

Streiff, A. J., Zimmerman, J. C., Soule, L. F., Butt, M. T., Sedlak, V. A., Willingham, C. B. and Rossini, F. D. PURIFICATION, PURITY, AND FREEZING POINTS OF 30 HYDROCARBONS OF THE API-STANDARD AND API-NBS SERIES. *J. Research Natl. Bur. of Standards* **41**, 323-328 (1948) *October.*

Thirty additional hydrocarbons have been added to the list of standards available at the Bureau of Standards. These include 8 paraffins, 6 cycloparaffins, 3 aromatics, 12 olefins and 1 acetylene. Very complete details of the purification processes, and the determinations of the boiling and freezing points, refractive indices and purity are included.

S. Katz

## 10. CHEMICAL ENGINEERING

### Adsorption

Amundson, N. R. A NOTE ON THE MATHEMATICS OF ADSORPTION IN BEDS. *J. Phys. Colloid Chem.* **52**, 1153-1157 (1948) *October.*

A complete mathematical solution is supplied for a particular type of adsorption.

J. D. Parent

### Distillation

Harbert, W. D. DISTRIBUTION CURVES—I. INTRODUCTION AND SOME SPECIAL CASES. *Petroleum Refiner* **27**, 94-100 (1948) *October.*

The use of distribution curves in the study of distillation processes are presented. The distribution curves, good for multi-component

and complex mixtures, summarize the result of an entire operation on a single graph and thus permit easy visualization of the effects of the many variables in a distillation. While being independent of the basis of calculation the curves permit the inclusion of additional ratios in the calculations and tend to simplify and condense complex distillation mathematics.

H. Dirksen

Smith, R. B. and Dresser, T. DISTILLATION CALCULATIONS IN IDEAL AND NON-IDEAL SYSTEMS. *Chem. Eng. Progress* 44, 789-794 (1948) *October.*

A method of calculation applicable to all binary and multicomponent (ideal and non ideal) system is presented. An example of its use is also included. The method is used to shorten the work of the design calculation and is shown to give reliable results.

H. Dirksen

## Extraction

Scheibel, E. G. FRACTIONAL LIQUID EXTRACTION. PART II. *Chem. Eng. Progress* 44, 771-782 (1948) *October.*

This is a second in a series of two articles on this subject, and is concerned with non-ideal systems. The operations considered are: separation o fethyl and isopropyl alcohols using xylene and water as solvents; separation of ethyl alcohol and methyl ethyl ketone using water and high-boiling kerosene; and the extraction of acetic acid from water with methyl isobutyl ketone. The basic equilibrium data for this new process are very meager, but methods of using available data for predicting distribution coefficients are described. Column capacity increases with packing free space, so a free space of 98% or better is recommended. Different systems showed important differences in optimum packing height. This process is expected to have many applications in the separation of mineral oils, vegetable oils, vitamins, fatty acids, and non-volatile acids.

C. L. Tsaros

## Fractionation

Bailey, R. V. and Coates, J. SIMPLIFIED MULTI-COMPONENT FRACTIONATION CALCULATIONS. *Petroleum Refiner* 27, 129-135 (1948) *October.*

The method of calculation presented offers a rapid and fairly accurate solution for minimum reflux. The solution is accurate and holds only for those cases with a component having a volatility intermediate between that of the key components, provided the distribution of the intermediate component can be estimated.

H. Dirksen

Boyd, D. M., Jr. FRACTIONATION INSTRUMENTATION AND CONTROL. PART I. *Petroleum Refiner* 27, 115-118 (1948) *October.*

In the first of a series of two articles, the author describes and presents flow diagrams for control of pressure on fractionating towers. Pressure control on a vacuum tower is achieved by regulating the amount of air introduced into the line just ahead of the steam jets. For atmospheric pressure operation, the tower is sometimes maintained just slightly above atmospheric pressure in order to eliminate the effect of varying barometric pressure. For towers operating under pressure, the control valve may be on the vapor line if a large amount of uncondensables are being handled. Where there is a small amount of uncondensables, the rate of flow of cooling water through the condenser may be controlled, or the amount of area available for condensing may be controlled by controlling the level of condensate. Where mixed uncondensables and vapor are being handled, various combinations of release gas control, rate of water control and extent of surface control may be used.

W. J. Merwin

Eld, A. C. PRESSURE DROP IN FRACTIONATING TOWERS. *Petroleum Refiner* 27, 119-121 (1948) *October.*

A plot of experimental pressure drop data versus vapor velocity is presented. The data were

taken on an 18 inch o.d. glass bubbletower. An alignment chart correlating vapor velocity, density of vapor and pressure drop is given. A table is presented showing computed pressure drops per tray of several commercial vacuum distillation towers and when the total computed pressure drops are compared with actual performance data, the agreement is very good.

W. J. Merwin

### Heat Transfer

Klinkenberg, A. NUMERICAL EVALUATION OF EQUATIONS DESCRIBING TRANSIENT HEAT AND MASS TRANSFER IN PACKED SOLIDS. *Ind. Eng. Chem.* 40, 1992-1994 (1948) *October.*

By use of error functions, close approximations of the solutions of equations describing transient heat transfer have been obtained and presented in the form of a nomograph. The equations are applicable to heat transfer, adsorption recovery, drying, and leaching.

C. L. Tsaros

## 11. PROCESS EQUIPMENT AND INSTRUMENTATION

### Flange Design

Lonngren, H. E. FLANGE DESIGN CONSIDERATIONS. *Petroleum Refiner* 27, 145-146 (1948) *October.*

The author presents calculations showing that a certain flange was considered unsafe by modern methods of calculation. However, the flange had actually withstood pressures several times that of the calculated. The author explains this by saying that because of the geometry of the situation the bolt load was compressing the gasket directly and there was no moment arm. A series of suggestions is given by the author for turning out good designs of flanges.

W. J. Merwin

### Industrial Furnace

Boyle, W. E. and Hoyt, P. R. APPLICATION OF COMBUSTION CONTROLS TO A PROCESS HEATER. *Petroleum Refiner* 27, 139-144 (1948) *October.*

The authors give a very detailed stepwise explanation of the instrumentation applied to a gas fired furnace in oil preheat service. Essentially the system consists of two elements: a temperature controller activated by the oil outlet temperature and acting upon a valve which controls the rate of gas flow to the burners; and an oxygen recorder-controller which has its detecting element in the furnace and activates a damper in the stack. Varying the position of the stack damper changes the pressure in the furnace and thereby regulates the amount of secondary air entering through the ports of the gas burner. In this manner, the gas and air are controlled to give the desired oil outlet temperature and an optimum $CO_2$ content in the flue gas. Diagrams are presented and the limitations of the system are discussed. The authors claim a reduction of fuel consumption of 15% by this system and a payout time of 3½ months based on fuel savings alone.

W. J. Merwin

### Reciprocating Pumps

Montroy, S. F. and Trotter, G. P. STEAM DEMAND OF DIRECT ACTING RECIPROCATING PUMPS. *Petroleum Refiner* 27, 91-93 (1948) *August.*

A procedure is developed whereby the steam demand of a reciprocating pump in service may be calculated. A nomograph is presented to simplify the work of calculation.

B. E. Hunt

## 12. MATERIALS OF CONSTRUCTION

### Corrosion

Stuart, A. H. THE CORROSION OF BURIED OR SUBMERGED PIPES. *Petroleum* (British) **11**, 252-253 (1948) *November.*

The author describes a series of laboratory tests conducted as a study of the reduction of the corrosion rate of buried or submerged ferrous metals. Specifically he discusses the use of zinc as a sacrificial anode in the protection of iron or steel pipe.

B. E. Hunt

### Materials of Construction

CHEMICAL ENGINEERING MATERIALS OF CONSTRUCTION. REVIEW. *Ind. Eng. Chem.* **40**, 1773-1936 (1948) *October.*

A series of articles on materials of construction is presented in which the literature published since the first review published in October, 1947 is summarized. The topics covered include: aluminum alloys; cements; ceramics; copper alloys; elastomers; fibers; iron, mild steels and low alloy steels; nickel and high nickel alloys; plastics; hard rubber; stainless steels. An extensive tabular section is included which summarizes the published information on physical and chemical properties of the materials.

W. J. Merwin

### Protective Coating

"TAILOR MADE" PAINTS FOR GASHOLDERS. *Gas World* (British) **129**, 550-551 (1948) *October* 9.

The author discusses the use of paint as a protective surface coating of iron and steel structures in the gas industry. The type of paint to be used as a primer, undercoat, or finish coat depends upon the resistance to water, abrasion, chemicals, and atmospheric exposure required in the specific installation. It is thought that the protection provided by a paint system depends primarily upon the surface preparation prior to painting and the thickness of the dry paint film. Since one paint cannot be expected to fulfill the requirements of all applications, a paint formulated for the specific application would be the most efficient and economical over a long period of time.

B. E. Hunt

## 13. NEW BOOKS

### Heat Conduction

Ingersoll, L. R., Zobel, O. J. and Ingersoll, A. C. HEAT CONDUCTION (WITH ENGINEERING AND GEOLOGICAL APPLICATIONS). New York, McGraw-Hill Book Company, Inc., 1948.

The authors develop the subject with special reference to the needs of the student who has neither the time nor mathematical preparation to pursue the study at great length. Fewer types of problems are handled than in the larger treatises, and less stress has been placed on purely mathematical derivation. The differential equations of many of the more usual cases are presented as well as some Bessel function and conjugate function theory and auxiliary graphical and approximation methods for many practical problems. Many applications which will be of interest to the geologist, geographer, and engineer are discussed.

R. T. Ellington

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